

CABLE SPlicing—UNDERGROUND

SETTING UP CABLE

CONTENTS	PAGE	
1. GENERAL	1	1.03 When setting up cable in splicing or pull-through manholes:
2. SETTING UP FOR SPlicing	2	(a) Cables must be racked so unoccupied ducts are not obstructed, thus reducing the capacity of the manhole.
3. SETTING UP IN PULL-THROUGH MANHOLES	5	(b) Cables must be set up so they do not contact pipes or other foreign metal structures in the manhole.
SPLIT GRIP METHOD	5	(c) Avoid making sharp bends. Keep the bending radius as large as practicable.
G SLACK PULLER METHOD	5	(d) Do not flatten or kink the cable.
4. PERMANENT SUPPORTS	9	(e) Use slow steady pressure when bending a cable.
CABLE HOOKS	10	
A.B. CHANCE CLIP	10	

1. GENERAL

1.01 This section covers the methods used for setting up cables, except coaxial cables, in splicing and pull-through manholes. Coaxial cables require special set up methods which are covered in Section 628-200-210. Refer to Section 632-020-250 and Section 626-500-101 for racking requirements that must be observed when setting up Connectorized Exchange Cable.

1.02 This section is reissued to incorporate information previously covered in Section 632-305-211, to substitute the A.B. Chance clip for the Hubbard clip, to add the use of the G slack puller and the F cable bender, and to delete reference to the one-man method. Since this is a general revision, arrows ordinarily used to indicate changes have been omitted.

1.04 Before bending a cable (just prior to splicing) having a capped or sealed end, the sealed end should be opened to permit the conductors to move more freely in the sheath. This will help prevent kinks from developing.

1.05 Before bending a cable, place a B cable bending shoe in the duct alongside the cable to protect the sheath against damage.

1.06 It is essential that cables in pull-through manholes are set up before splices are made in adjacent manholes.

1.07 *The connector end of connectorized exchange cable must be firmly anchored in its final position before attempting to develop slack in adjacent manholes. Slack must be developed from the pulling eye (leading) end of the cable. (See Section 632-020-250.)*

1.08 When setting up polyethylene-sheathed cable, do not use house line or lashing wire for temporary ties. Use muslin or a cable bending

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strap. Do not allow polyethylene-sheathed cable to sag over the edge of the duct. Insert a cable bending shoe to protect the cable sheath.

1.09 The recommended cable racking positions and splice bay locations are covered in Section 632-305-215. By following those recommendations, orderly cable arrangement and complete duct utilization will be assured.

2. SETTING UP FOR SPLICING

2.01 Cables 1-1/2 inches in diameter or smaller may be set up by hand. Polyethylene-sheathed cable should be secured to slotted cable hooks with sealing clamps or lashed cable supports.

2.02 Cables larger than 1-1/2 inches in diameter will require the use of cable racking jacks and/or cable benders depending on cable size and the stiffness of the cable. Most polyethylene-sheathed cable can be set up for splicing as shown in Fig. 1.

The board placed on the cable hooks is useful in aligning the cable ends and maintaining the proper distance from the manhole wall. The free end of the cable may be supported with a rope tied to the manhole guard to maintain cable alignment while bending the cable.

2.03 Lead sheathed, poly-jacketed lead sheathed, and the large, stiff polyethylene-sheathed cables will best be set up using a cable bender.

2.04 *Lead sheathed* cable may be set up with the D or E cable benders by using the following method:

- (1) Identify the location of the proposed bends by using B paper tape to mark the locations on the cable. Place a folding measuring rule in the position the cable will occupy and note the location and length of the bends. Align the rule

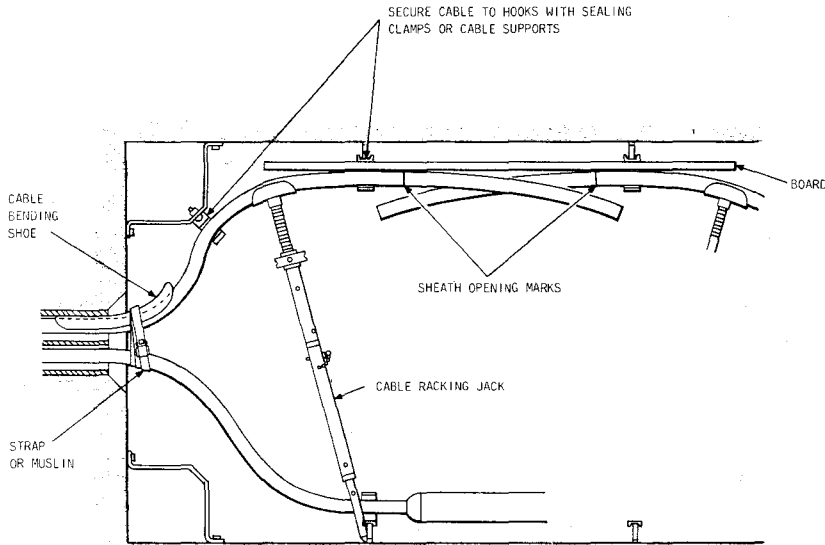


Fig. 1—Setting Up Polyethylene-Sheathed Cable

on the cable and mark these locations with the paper tape. Allow for the cable to be straight for about 2 inches from the duct entrance before starting the first bend. The second bend should end just short of the end cable rack as shown in Fig. 2.

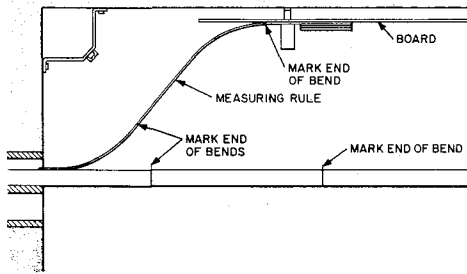


Fig. 2—Marking End of Bends on Cable Sheath

- (2) Support the end of the cable with a rope tied to a cable rack or to the manhole guard above the manhole. The cable may be moved in the direction of the bend by using the cable bender as a fulcrum.
- (3) Remove the center shoe of the bender from the rack guides and place the frame on the cable. Replace the center shoe and bring it to bear slightly on the cable by turning the pinion with the wrench. Be sure the center shoe is properly aligned before applying pressure on the wrench.
- (4) Move the bender to the position shown in Fig. 3, and deflect the cable approximately $1/8$ inch by turning the wrench and moving the end of the cable in the direction of the bend. Return the wrench to the starting position. Move the bender approximately $1/4$ inch along the cable away from the duct and deflect the cable again. Repeat these operations until the desired bend is made, keeping the radius of the bend as large as practicable.

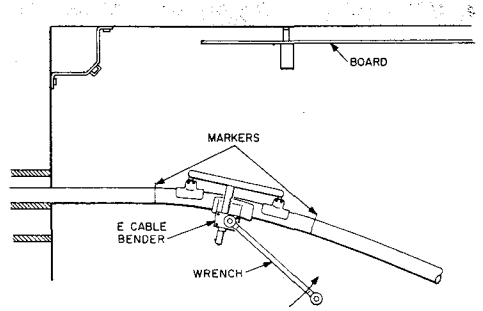


Fig. 3—Making First Bend With D or E Cable Bender

- (5) For the reverse bend, move the bender to the position indicated in Fig. 4. Then bend the cable as described in (3). When the bends are completed and in proper relation to the duct and first rack, straighten the free end of the cable along the board.

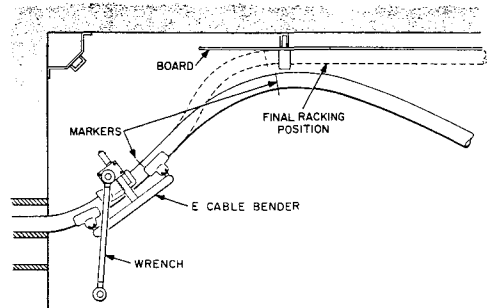


Fig. 4—Final Bending With D or E Cable Bender

- (6) A cable dresser should be used to dress out kinks or irregularities taking care not to unduly weaken the sheath.

2.05 Lead sheathed, poly-jacketed lead and large, stiff polyethylene-sheathed cables can be set up with the F cable bender by using the following method:

double racked manhole. This is the "offset distance" which must be known to properly position the F cable bender.

- (1) Determine the distance from the duct to the manhole wall, or to the racking position if the cable will occupy the inside position in a
- (2) Place the F cable bender on the cable and proceed as shown in Fig. 5 and 6.
- (3) Secure polyethylene-sheathed cables to slotted cable hooks with sealing clamps or lashed cable supports.

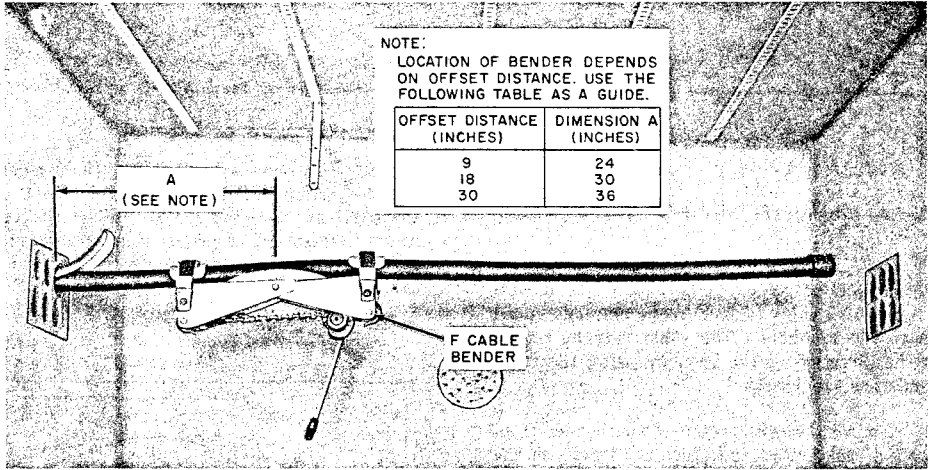


Fig. 5—Initial Position for Splicing Manhole Racking

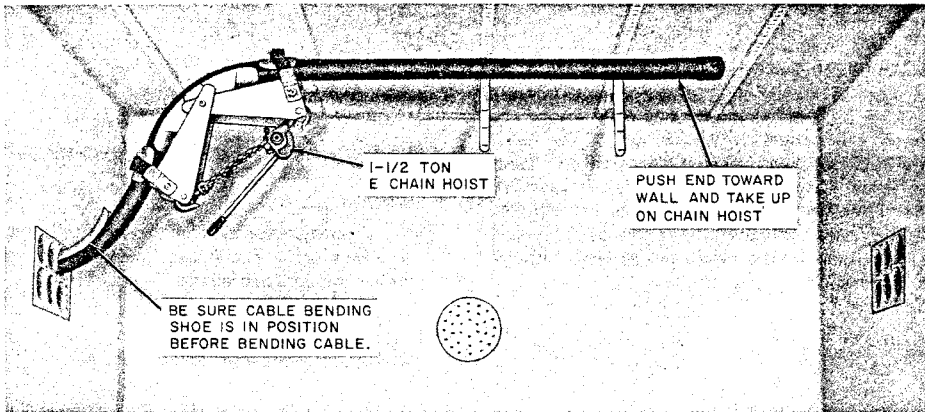


Fig. 6—Completing the Bend

3. SETTING UP IN PULL-THROUGH MANHOLES

3.01 The method used to set up cable in pull-through manholes will depend largely on the type of cable, the size of cable, the length of the conduit sections from which slack must be obtained, and other factors. For smaller cables in a relatively short conduit section, the required slack can often be pulled by hand.

SPLIT GRIP METHOD

3.02 Place a split grip on the cable at the duct from which the slack is to be pulled. Tie two or three double strands of house line to the duct end of the grip to facilitate removal and slide the grip into the duct as far as possible. Pull slack into the manhole with a block and tackle, chain hoist, or other similar tool. Protect the cable sheath at ducts by placing cable bending shoes in the ducts.

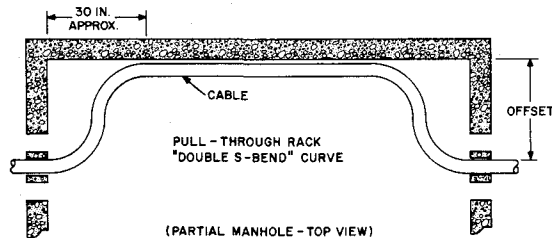
3.03 As slack is pulled into the manhole, form the cable at the opposite end of the manhole by applying pressure with a cable racking jack or a hydraulic jack.

3.04 Proceed with pulling, making the first bend and racking the cable as slack is obtained. Racking the cable is simplified if a board is placed on the cable hooks with a second board placed on edge against the cable racks. The boards will help to straighten the cable, protect the cable sheath, and provide clearance between the cable and manhole wall. Form the second bend in the same manner as the first.

G SLACK PULLER METHOD

3.05 The G slack puller is intended for use with the F cable bender to rack cables in pull-through manholes. With this method, the necessary slack is pulled into the manhole first and then the cable is bent into the corners of the manhole. To rack the cable, determine the amount of slack required (see Fig. 7) and proceed as follows:

- (1) Clean lubricant from cable sheath for placement of split luffing grips at both ends of the manhole.



OFFSET DISTANCE (INCHES)	TOTAL SLACK REQUIRED * (INCHES)	APPROXIMATE RULE
9	4	TOTAL SLACK EQUALS OFFSET LESS 5 INCHES
12	7	
15	10	
18	13	
21	17	
24	21	NONE
27	25	
30	31	

* APPLIES TO MANHOLE OF ANY LENGTH.

Fig. 7—Slack Required for Racking in Pull-Through Manholes

- (2) Depending on the type of lubricant used, it may be necessary to apply one layer of friction tape to cleaned area of cable, starting at the ducts and leaving one inch of sheath showing between wraps, to keep luffing grips from slipping. A C sealing clamp (hose clamp) around the end of the grip also helps prevent slippage.
- (3) Place split luffing grip on cable at each end of manhole. Attach two lengths of heavy cord to the duct end of each luffing grip. The cords should be on opposite sides of the luffing grips. They can be used to aid removal of luffing grips which are partially in the duct.
- (4) Place cable bending shoes in the ducts and slide the luffing grips into the ducts as far

as possible, especially in small manholes. Place cable bending shoe between split ring of the grip and the cable (Fig. 8).

- (5) Attach a 1-1/2 ton chain hoist to the pulling yokes of the luffing grips and position the G slack puller with the head of the tool on the cable at the center of the manhole. The adjustable strut points toward the wall opposite the wall on which the cable will be racked. Secure the slack puller to the cable with the two elastic cords and with vinyl tape. There must be a minimum spacing of 12 inches between the duct shoe and the end of the shoe on the head of the tool. Engage a link near the center of the chain in the chain lock on the end of the strut. Always start with the strut adjusted to minimum length.

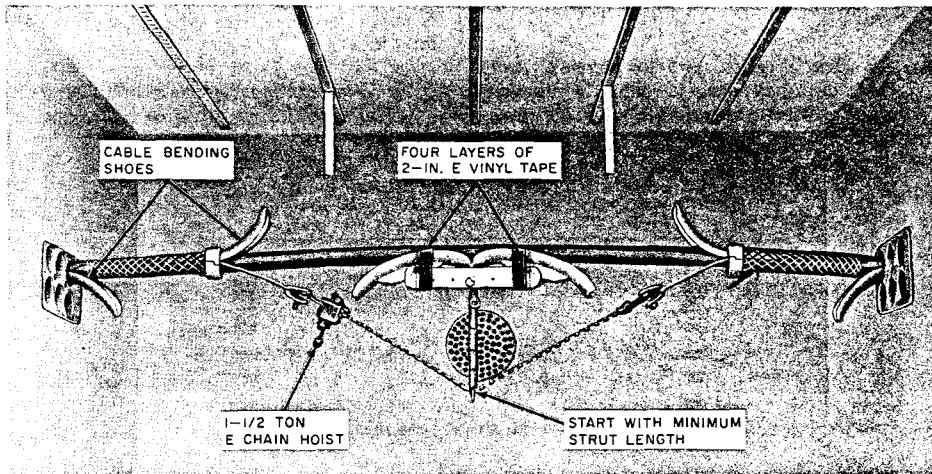


Fig. 8—Initial Position of G Slack Puller for Pull-Through Manhole Racking

(6) Take up on the chain hoist. The chain hoist pulls slack into the manhole while the strut pushes the cable toward the manhole wall. It will be necessary to reposition the end of the strut on the chain as the pull progresses to keep the strut at right angles to the head of the tool. The strut length can be increased as the pull progresses. Be sure the cable bending shoes

remain in position in the ducts to prevent damage to the cable. As shown in Fig. 9, continue to take up on the chain hoist until the required amount of slack has been developed in the manhole.

(7) Remove the slack puller, chain hoist, and luffing grips. Leave the cable bending shoes in the ducts.

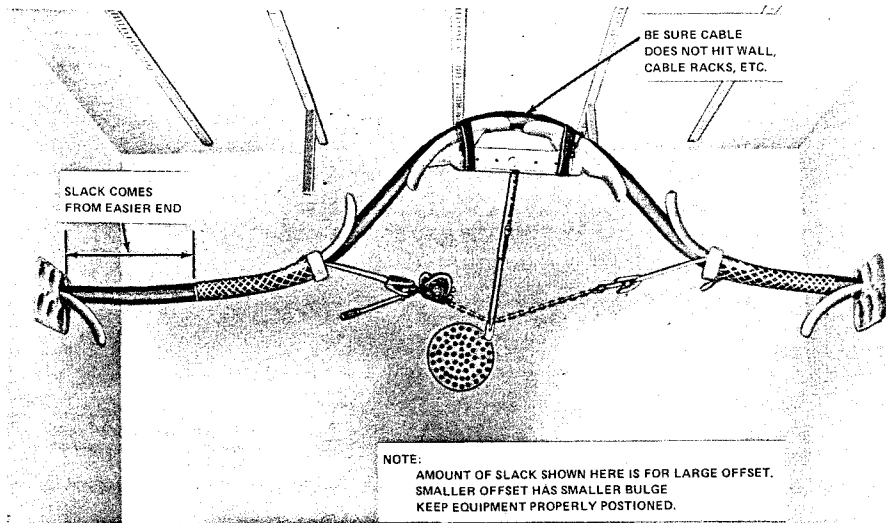


Fig. 9—Developing Slack

(8) To start bending the cable into the corners of the manhole, position one or two B cable racking jacks on the cable with a cable bending shoe between the cable and the jack (see Fig. 10). A minimum spacing of 1 foot is required between the shoe in the duct and the shoe under the jack. Assemble appropriate extension lengths

and carefully jack the cable toward the corners of the manhole, repositioning the jacks as required. Protect the cable from contact with racks, walls, etc, by placing cable bending shoe segments behind the cable where necessary. Form the cable into a smooth curve and remove the racking jacks.

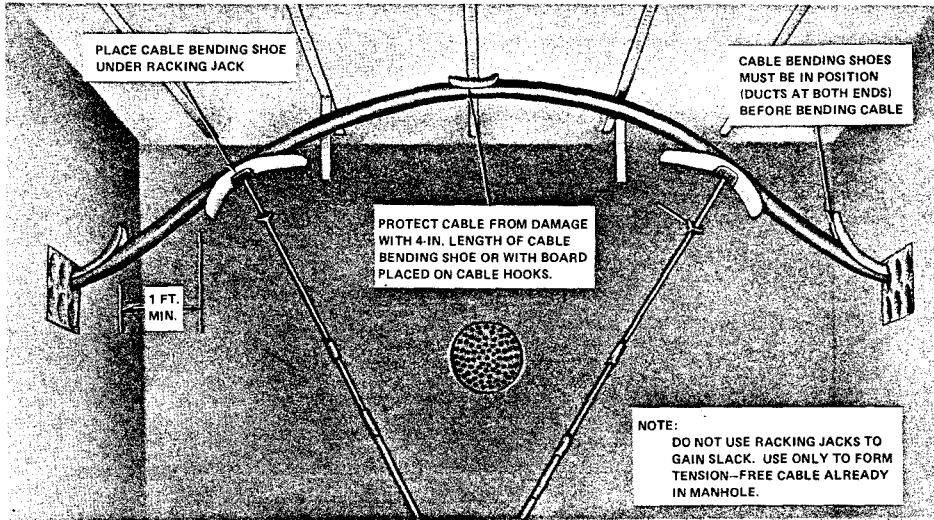


Fig. 10—Bending Cable With B Cable Racking Jacks

(9) Complete the cable bending using the F cable bender. Position the cable bender on the cable (Fig. 11), engage the chain hoist on the tool, and take up on the hoist. Complete bends at both ends of the manhole to obtain final racking shape shown in Fig. 12. Remove the bender and support the cable with cable hooks of the required size.

4. PERMANENT SUPPORTS

4.01 After the splice is completed and racked in its position, replace all temporary ties with permanent supports.

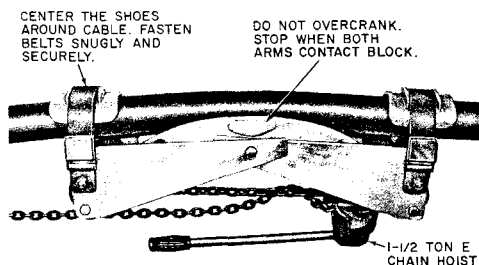


Fig. 11—F Cable Bender Positioned on Cable

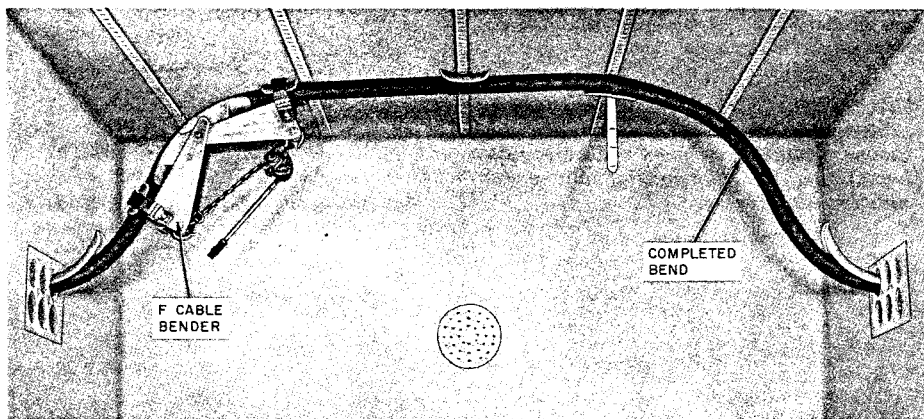


Fig. 12—Final Racking Shape Obtained With F Cable Bender

CABLE HOOKS

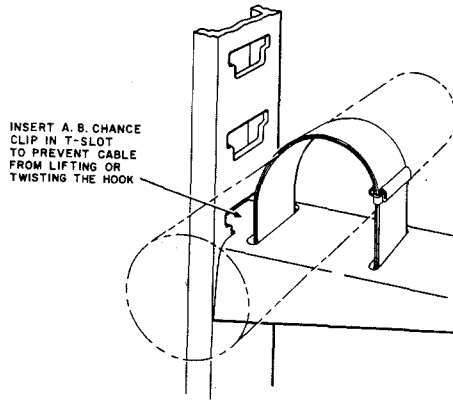
4.02 All sizes of cable hooks (Section 622-520-100) are provided with slots for securing polyethylene-sheathed cables to the hooks with lashed cable supports or sealing clamps. Figure 13 illustrates the clamping of a cable to a slotted cable hook. Generally, lead-sheathed cable need not be secured to the cable hooks.

4.03 When corrosion resistant M cable hooks are used, lead-sheathed cable must not be allowed to come into direct contact with the M cable hook. At each hook contact area, wrap the cable with a piece of scrap lead sheath or lead lashing tape.

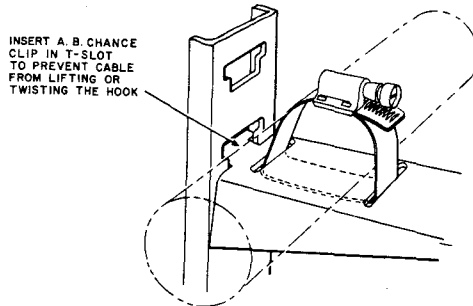
A.B. CHANCE CLIP

4.04 When polyethylene-sheathed cable is secured to slotted cable hooks, movement of the cable may cause the hooks to lift or twist in the T slot of the cable rack. An A.B. Chance clip inserted in the T-slot of the rack will prevent movement of the hook in the T-slot.

CAUTION: Do not install a locking clip (zinc) where M cable racks and hooks (Monel) are used. Under such conditions, the zinc locking clip would quickly deteriorate.



LASHED CABLE SUPPORT IN PLACE



SEALING CLAMP IN PLACE

Fig. 13—Securing Cable to Slotted Cable Hooks